REMARKS/ARGUMENTS

In the March 25, 2003 Office Action, the Examiner rejected claims 1-3, 6-10, 14-16, 21-24, 27-29, 31-36, 52-54, 56-61, 65-67, 72-78, 82-87, 91-93, and 98-102 pending in the application. The Examiner is respectfully requested to reconsider Applicants' claims in light of the following remarks.

Claims 1, 2, 14, 21, 24, 27, 28, 52, 53, 65, 75, 78, 79, and 91 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kondo et al. (hereinafter "Kondo"), Beardsley et al. (hereinafter "Beardsley") and Vanell et al. (hereinafter "Vanell"). In particular, the Examiner states that Kondo teaches a polishing method for removing a metal surface where the metal is oxidized to form a thin removable oxide film which includes the steps of causing a wafer to contact a polishing pad and rotating the wafer and pad, and supplying a slurry having less than 1 wt% of polishing abrasive between the wafer and the pad. The Examiner further states that although Kondo doesn't describe supplying slurry through a plurality of pores in the pad and through at least one pore in the platen connected to the pad, Beardsley teaches a CMP apparatus which supplies a slurry through a porous pad and through holes formed in the platen connected to the pad. The Examiner therefore contends that it would have been obvious for one having ordinary skill in the art to modify Kondo's method in light of Beardsley's slurry distributing system because Beardsley teaches that the slurry distributing system is inexpensive and uncomplicated and would distribute slurry more uniformly on the pad to have a more uniform polishing action.

The Examiner further goes on to state that although the prior art does not describe establishing a temperature at the contact area by circulating a heated fluid through the heat conductive platen or by heating or cooling the slurry before distributing it to the contact area, Vanell teaches that chemical reactions are sensitive to the temperature and the reaction rate typically increases with the temperature. The Examiner further states that Vanell teaches circulating fluid to heat or cool the platen to control the rate of reaction of the polishing process and also to heat the platen to ensure the chemicals in the slurry have minimum reaction rate when starting a CMP process. Accordingly, the Examiner contends that it would have been obvious at the time of the invention for one skilled in the art in light of Vanell's teaching of controlling the temperature of the process to heat or cool the platen and also the slurry in order to

control the rate of the reaction or to heat the slurry before distributing it to the contact area to ensure the chemicals in the slurry have a minimum reaction rate when starting a CMP process.

Finally, the Examiner states that with reference to claim 24, the friction between the wafer and the polishing member while rotating would establish a temperature at the contact area while polishing or distributing the slurry and that with reference to claims 52 and 78, Kondo discloses the metal to be polished is copper and the down force is 220 g/cm^2 or 3.13 psi. The Examiner also states that the rate of removal of the copper surface would have to be approximately proportional to the contact pressure since a higher pressure would increase polishing rate and a lower pressure would slow down the polishing rate. Applicants respectfully traverse this rejection.

Kondo generally discloses polishing a metal film formed on an insulating film having a groove where the polishing is done with a polishing solution that contains an oxidizer and a substance which renders oxide water-soluble. The polishing solution does not include a polishing abrasive or, alternatively, the polishing solution includes a polishing abrasive at a low concentration of less than 1 wt% which has a pH and oxidation-reduction potential with the domain of corrosion of the metal film. Beardsley discloses a CMP apparatus having a rotating platen with a recess which has a first portion in communication with a delivery means for delivering slurry into the first portion and a second portion extending under the polishing pad. Slurry is delivered from the first portion of the recess to the second portion of the recess and then to the upper surface of the pad where it aids in the polishing of the substrate. Vanell discloses controlling the temperature of a chemical reaction in a CMP process with a heat exchanger where the heat exchanger is coupled to a platen for both heating and cooling. The heat exchanger heats the platen so that the CMP process is above a predetermined minimum temperature to ensure a minimum chemical reaction rate. Typically, the heat exchanger uses ethylene glycol as the temperature transport/control mechanism to heat or cool the platen.

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under §103, teachings of references can be combined only if there is some suggestion or incentive to do so." ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 1929, 933 (Fed. Cir. 1984). Moreover, virtually all inventions are necessarily combinations of old

elements. The notion therefore, that combination elements can be declared invalid merely upon finding similar elements in separate prior patents would necessarily destroy virtually all patents and cannot be the law under §103. Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1575, 1 USPQ2d 1593,1603 (Fed. Cir. 1987).

Applicants' claims are directed to a process for removing a metallized surface from a workpiece where the removal of the metallized surface is characterized by a formation step for formation of a removable surface film surface and an abrasive step for removal of the film where the process includes contacting a workpiece with a polishing member while affecting motion between the workpiece and polishing member, causing a polishing solution having less than 1 wt% of a polishing abrasive to be distributed at a contact area between the workpiece and polishing member where the polishing abrasive is distributed through at least one bore that is formed within a platen that is connected to the polishing member, and establishing a temperature at that contact area by heating and cooling the polishing solution before causing the polishing solution to be distributed to that contact area. In response to the Applicants' prior arguments that Vanell fails to teach establishing a temperature at a contact area by heating and cooling the polishing solution before distributing the polishing solution to the contact area, the Examiner contends that Vanell's teaching that slurry should be at a predetermined temperature to ensure chemical in the slurry to have a minimum reaction rate when starting a CMP process would suggest to establish the slurry at a certain temperature before supplying it to the contact area for the polishing process to take place. The Examiner goes on to state that Applicants' argument that it is not obvious to cool or heat the slurry before distributing it to the contact area because cooling or heating of the slurry before distribution can affect reactions within the slurry is not persuasive because Vanell teaches that the slurry has to be established before any CMP process can take place.

In Applicants' invention, the abrasive-free polishing solution flows through conduits and bores in a platen which is connected to a polishing pad so that the abrasive-free polishing solution flows up through the polishing pad. Using this method, fresh abrasive-free polishing solution is distributed uniformly to the metallized surface of a workpiece. As the abrasive-free polishing solution uniformly contacts the workpiece, a removable surface film containing the metal is formed on the metallized surface. The removable surface film is subsequently uniformly removed by the mechanical abrasive action of the polishing surface of the polishing

pad. In this manner, the rate of formation of the removable surface film on the metallized surface by the polishing solution is increased, making abrasion the rate-determining step of the metal removal mechanism. (See page 14, lines 4-14 of Applicants' specification.) Further, the formation of the removable surface film may be facilitated by modifying the temperature during planarization. In particular, the abrasive-free polishing solution may be heated before being delivered to the manifold apparatus (which delivers the abrasive-free polishing solution through the conduits and bores of the platen) or planarization may be facilitated by decreasing the temperature of the system by cooling the abrasive-free polishing solution before delivering it to the manifold apparatus. (See page 14, lines 18-29 of Applicants' specification.) By using the present invention, the metallized surface of a workpiece can be readily formed to a removable surface film by a polishing solution so that abrasion of the metallized surface is the rate-determining step of the planarization process.

Applicants' invention, where heated or cooled slurry is provided to the contact area between a workpiece and a polishing surface by distributing the slurry through a platen connected to the polishing surface, creates an efficient and uniform method to effect the removal rate of a film during an abrasive step for removing the film. Vanell teaches the use of ethylene glycol as a temperature transport/control mechanism to heat or cool the platen (See column 9, lines 47-49.) Applicants' invention improves the process disclosed in Vanell by heating and/or cooling a slurry before transporting to a contact area between a workpiece and a polishing surface, and transporting the slurry to that contact area by routing it through the platen. Therefore, the cooled or heated slurry can also function to cool or heat the platen as it travels through the bores created in the platen. To further control the temperature of the CMP process, the platen may also be heated and/or cooled with additional means.

It would not have been obvious to one of ordinary skill in the art to combine Kondo, Beardsley and Vanell to arrive at Applicants' claimed invention because 1) Beardsley fails to disclose a bore through the platen through which slurry is delivered through the platen to the polishing pad, and 2) cooling and/or heating the slurry before routing it through the platen is not taught or suggested by Vanell.

Claims 1-3, 5, 14, 21, 24, 27-29, 31, 52-54, 56, 65, 75, 78-80, 82, and 91 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kondo, Sato (hereinafter "Sato"), and

Vanell. In particular, the Examiner states that although Kondo does not describe supplying slurry through a channel formed in the pad and through at least one pore which is formed in a platen and collinear with the channel, Sato does describe a polishing apparatus where slurry is supplied through a channel formed in the pad and a pore formed in the platen which is collinear with the channel formed in the pad. The Examiner therefore contends it would have been obvious to modify Kondo's method in light of Sato's slurry distribution system because Sato shows that slurry can be distributed uniformly on the pad and therefore would help to more uniformly polish the wafer. The Examiner further states that although the prior art fails to describe establishing the temperature at the contact area by circulating a heated fluid through the heat conductive platen or by heating or cooling the slurry before distributing it to the contact area, Vanell teaches that the chemical reactions are sensitive to the temperature and the reaction rate typically increases with the temperature in CMP and that the temperature is held within a certain range to control the rate of reaction. Therefore, the Examiner contends that it would have been obvious at the time of the invention for one skilled in the art in light of Vanell's teaching of controlling the temperature of the process to heat or cool the platen and also the slurry in order to control the rate of the reaction, to heat the slurry before distributing it to the contact area to ensure the chemicals in the slurry would have a minimum reaction when starting a CMP process. Applicants' respectfully traverse this rejection.

"[A]ppellants cannot pick and choose among individuals parts of assorted prior art references 'as a mosaic to recreate a facsimile of the claimed invention.'" Akzo N.V. v. U.S. Int'l Trade Comm'n, 808 F.2d 1471, 1781, 1USPQ2d 1241, 1246 (Fed. Cir. 1986) (Quoting W.L. Gore and Assocs., Inc. v. Garlock, 721 F.2d 1540, 1552, 220 USPQ 303, 312 (Fed. Cir. 1983)). As previously stated, there is no suggestion or teaching in Vanell to heat or cool the slurry prior to distributing the slurry to the contact area between a workpiece and a polishing member and routing the precooled or preheated slurry through a platen. In fact, if Kondo, Beardsley, and Sato were combined, the result would be providing a polishing solution having less than 1 wt% abrasive to the polishing apparatus shown in Sato with the platen in Sato modified as taught in Vanell so that the platen can be heated or cooled. It would not be obvious to one of ordinary skill in the art, and would actually teach away from the invention, to heat or cool the abrasive slurry prior to routing it through the platen given that the temperature of the platen is already controlled.

In view of the foregoing, Applicants respectfully submit that all of the pending claims are allowable over the prior art of record. Reconsideration of the application and allowance of all pending claims is earnestly solicited. Should the Examiner wish to discuss any of the above in greater detail or deem that further amendments should be made to improve the form of the claims, then the Examiner is invited to telephone the undersigned at the Examiner's convenience.

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Respectfully submitted,

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